Attachment C
Well Construction/Conversion Information
Application for Class III Underground Injection Control Permit

Florence Copper Project
Florence Copper Inc.

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Attachment C: Well Construction/Conversion Information

Part I. Well Schematic Diagram (40 CFR § 146.34)

C.1 INTRODUCTION

This Attachment describes proposed well design attributes and well construction procedures.

This Attachment has been prepared in support of an application (Application) by Florence Copper, Inc. (Florence Copper) to the United States Environmental Protection Agency (USEPA) for an Underground Injection Control (UIC) Class III (Area) Permit for the planned In-Situ Copper Recovery (ISCR) facility at the Florence Copper Project (FCP) in Pinal County, Arizona. With this Application, Florence Copper seeks authorization to construct and operate a commercial-scale ISCR facility at the FCP site. Florence Copper proposes to incorporate the pilot-scale Production Test Facility (PTF), which is currently operating under UIC Permit R9UIC-AZ3-FY11-1, into the planned commercial-scale ISCR facility at the FCP site.

C.2 WELL DESIGN

Injection, recovery, observation, and perimeter wells will be of a single design, with minor variations in the screen configuration to accommodate formation characteristics. Injection and recovery wells may have continuous well screen or segmented well screen through the injection zone. Perimeter wells and observation wells constructed outside of the ISCR area but within the area of review (AOR) will have a single well screen segment that spans the entire interval. Selected injection and recovery wells constructed in the ISCR area, but outside of the active ISCR operations, will be used as observation and perimeter wells. As the well field expands, these wells will be converted for use as injection and recovery wells. Similarly, injection and recovery wells constructed within the ISCR area will alternate roles between injection and recovery during the course of operations.

Well design details are shown on Figures C-1 through C-4. Figure C-1 shows details of a typical injection/recovery well. Figure C-2 shows construction details of a typical injection/recovery well head. Figure C-3 shows construction details of a typical observation/perimeter well. Figure C-4 shows construction details for the annular conductivity device (ACD) that will be installed on all injection, recovery, observation, and perimeter wells. These wells will be constructed with fiberglass reinforced plastic (FRP), polyvinyl chloride (PVC), or other corrosion resistant well casing.

C.2.1 Well Casing

The surface casing will be low carbon steel manufactured in accordance with ASTM International (ASTM) Specification 153-89A (1989) Grade A (or better) steel. This casing will be of a diameter sufficient to allow a minimum 2½-inch annular space between the casing wall and borehole wall to ensure that an adequate seal can be installed.

The surface casing diameter will vary based on the diameter of the planned well casing to be installed. Because of the chemical environment in which the casing will be installed, FRP, PVC, or other corrosion-resistant threaded casing will be used to complete the injection, recovery, observation, and perimeter wells. These casing materials will be of sufficient grade so that they will not fail in tension and will not collapse or burst, and will be chemically resistant to the process solutions.

Well screen made of PVC or other suitable material may be used in the lower portion of each injection, recovery, observation, and perimeter well as necessary to keep the hole open and to provide the operational flexibility to isolate segments of the full length of the injection and recovery zone.

C.2.2 Casing Centralizers

Casing centralizers will be installed on the well casing every 40 feet along the entire well casing, including screens, where applicable. The centralizers will be made of grade 316 stainless steel or PVC and will be suitable for contact with process solutions. Grade 316 stainless steel is resistant to corrosion by the planned ISCR process solutions.

C.2.3 Screened Interval

The screened interval will vary in length at each well and may include one or more screened segments within the full length of the injection zone. Florence Copper maintains the option to complete injection, recovery, observation, and perimeter wells without well screen and filter pack (open hole) where feasible. If open hole completions are selected in the injection zone, all other aspects of the proposed design will remain in effect. No screened interval will be installed higher than 40 feet below the Lower Basin Fill Unit (LBFU)/oxide bedrock contact.

C.2.4 Annular Seal

The annular seal will be installed from 40 feet below the LBFU/oxide bedrock contact to the surface. The annular seal material will be Type V cement and will be installed by the tremie method as described below in Section C.3.6.

C.2.5 Annular Conductivity Device

Florence Copper will install two ACDs on each injection, recovery, observation, and perimeter well at the limits of the exempted aquifer. One ACD will be installed at a point 10 feet below the MFGU, and a second ACD will be installed no more than 10 feet above the MFGU. In areas where the MFGU lies more than 200 feet above the bedrock/LBFU contact, an ACD will be installed no more than 190 feet above the bedrock/LBFU contact, and a second ACD will be installed no more than 210 feet above the bedrock/LBFU contact.

This placement of the ACDs will provide an indication of solution migration prior to reaching the vertical limit of the Aquifer Exemption before a hypothetical solution excursion would reach the underground source of drinking water (USDW), and after a hypothetical excursion into the USDW. The ACDs will be installed at this level on every ISCR well within the commercial wellfield.

During wellfield development, ISCR wells installed in the interior of the wellfield will serve as perimeter and observation wells until such time as the wellfield expands to include those wells for injection and recovery uses. Consequently, the only perimeter and observation wells that will not be used later for injection and recovery of fluids are those located at the edge of the maximum wellfield footprint. Although these perimeter wells and observation wells will not be used for injection and recovery of solutions, each of these wells will have ACDs installed at the limits of the exempted aquifer as described above. Figures C-1 and C-3 show typical ACD installation above and below the MFGU.

Each ACD will consist of a pair of stainless steel (grade 316) casing centralizers spaced 3 feet apart and connected to electrical wires which extend to the surface. The ACD will be constructed of materials suitable for contact with the annular seal materials and process solutions. The ACD will be constructed to detect fluid movement through any micro-annulus that might form between the well casing and the cement seal, and will also be in contact with the formation to detect migration of injected solution through the formation, outside of the cement seal, should any occur. Details of the ACD are presented on Figure C-4.

Six early warning ACDs will be installed within each 500-foot by 500-foot resource block at a depth of 20 feet above the bedrock/LBFU contact to serve as an early warning of vertical migration of injected fluid. This number of ACDs represents 10 percent of the injection wells to be installed within each resource block. The early warning ACDs will be installed on wells designated for injection use when the wells are commissioned. As wellfield development progresses, the injection wells will transition to use as recovery wells, and recovery wells will transition to use for injection. Partial resource blocks located at the edge of the ISCR wellfield contain fewer wells than the full resource blocks and will have early warning ACDs installed on 10 percent of the injection wells.

The early warning ACD installation will be prioritized in each resource block as follows:

1. Where mapped faults transect a resource block, two ACDs will be installed on wells that are projected to penetrate the fault plane. The additional four ACDs will be installed at locations distributed across the resource at approximate even spacing.
2. Where mapped faults transect a corner or small portion of a resource block, a minimum of one ACD will be installed on a well that is projected to penetrate the fault plane. The remaining ACDs will be installed at locations distributed across the resource at approximate even spacing.
3. In partial resource blocks located at the edge of the PTF wellfield, an early warning ACD will be installed on at least one well if fewer than 10 wells are planned for the resource block, or will be installed on 10 percent of the wells in the block if more than 10 wells are planned for the resource block. ACDs installed in partial resource blocks at the edge of the wellfield will be installed in areas where mapped faults are projected or will be approximately evenly distributed across the resource block if no mapped faults transect the resource block.

Installation of early warning ACDs on 10 percent of the injection wells will provide a dataset that will support statistical analysis of monitoring results to demonstrate baseline conditions and assess changes in baseline conditions. Prioritizing installation of the ACDs at mapped faults will provide early warning of potential vertical migration of injected fluid along those faults. The typical placement of early warning ACDs at wells that penetrate mapped fault planes is shown on Figure C-4a.

For the commercial ISCR wellfield, Florence Copper will conduct statistical analysis of baseline ACD resistivity data to calculate an alert level (AL) for future ACD monitoring. The well bore conductivity AL value for each resource block will reflect the range of variability observed in background well conductivity measurements. The AL value will be established as a Background Threshold Value (BTV) calculated using baseline well bore conductivity values measured at the wells within the resource block. The number of wells contained in each resource block varies from 3 wells in the smallest blocks to approximately 60 wells in the largest blocks. The BTV will be calculated using data from all of the wells planned for each resource block. Resource blocks that have fewer than 4 wells will use the BTV from the nearest adjacent resource block. The BTV for each resource block will be calculated using ProUCL, a software package prepared and promulgated by the USEPA.

Three background well bore conductivity measurements will be taken at each Class III well over a period of 2 weeks and beginning at least 2 weeks after the cement well seal has been emplaced. A minimum of three measurements are recommended to ensure that equipment and procedural variability do not produce an undue impact on the conductivity values measured. Because the background data collection period is relatively short, the magnitude of potential temporal natural variation in conductivity values may not be fully characterized. To account for potential long-term temporal variations in measured conductivity values, the historical conductivity data collected from the existing monitoring wells in the previously developed resource blocks will be assessed to quantify the degree of variation from a mean conductivity value over the observation period. In the case of the first resource block to be developed, the PTF observation wells will be used to assess potential long-term variability.

Florence Copper reports the annular conductivity data for the PTF wells to ADEQ and USEPA quarterly. The most recent quarterly report (2019 Q4) was transmitted to the USEPA in January 2020. The 2019 Q4 quarterly report states that annular electrical conductivity readings have remained approximately constant or increased slightly in 8 of the 11 monitored wells since monitoring began in Q3 2018. Annual electrical conductivity has decreased in wells O-04, O-06, and WB-01 during that same time. The results of the monitoring indicate the absence of injected fluid at annular conductivity device locations. These monitoring results indicate that no migration of injected fluid has occurred at the well casing/cement seal interface. The PTF ACD data are provided in Exhibit C-1.

C.2.6 Pressure Transducers

Each of the injection, recovery, observation, perimeter, and point of compliance wells will be fitted with dedicated pressure transducers for fluid level measurement. Injection and recovery wells will include one transducer installed within the well casing above the packer. Observation and perimeter wells will include a single transducer installed within the well casing to measure fluid levels at the edge of the ISCR wellfield. Transducer installation locations and cable configuration are shown on Figure C-5.

Fluid electrical conductivity will be monitored at the observation wells using an electronic sensor. The electrical conductivity sensor may be combined with a pressure transducer as a single instrument, or it may be a separate instrument, depending on the model of instrument selected. In the event that the fluid conductivity sensor malfunctions, Florence Copper will collect fluid samples for conductivity analysis on a contingency basis.

C.2.7 Tubing and Packer Configuration

Injection, recovery, observation, and perimeter wells will be of a single design, with minor variations in the screen configuration to accommodate formation characteristics. Injection and recovery wells may have continuous well screen or segmented well screen through the injection zone. Injection tubing will be used in all injection wells to covey injected fluid to a point below the fluid level in each injection well. Packers may be used in the injection wells, or the injection wells may be operated without packers. Recovery wells will use tubing to convey recovered fluid from the pump to piping at ground surface. Recovery wells may be operated with or without packers depending on operational considerations. Typical tubing and packer (when used) configurations are shown on Figure C-5.

Part II. Well Construction or Conversion Procedures (40 CFR §§ 144.52, 146.32 & 146.34)

C.3 WELL CONSTRUCTION

The well construction description provided below includes details for drilling, open-hole geophysics, installation of casing and ACDs, screen and filter pack installation, cementing, and cased-hole geophysics.

C.3.1 Injection Interval

Fluids will only be injected at depths greater than 40 feet below the top of the oxide zone. To ensure that the injection interval is at least 40 feet below the top of the oxide zone, Florence Copper will case and cement all injection wells from ground surface to at least 40 feet below the top of the oxide zone. Florence Copper may develop the injection interval for each well by installing well screen and short blank casing sections through the oxide interval below the bedrock exclusion zone or may inject into the open borehole below the bedrock exclusion zone.

C.3.2 Borehole Drilling

Borehole drilling consists of drilling a large diameter borehole to accommodate installation of surface casing to a depth of 20 feet, then drilling a narrower borehole from the bottom of the surface casing to the planned total depth of the well. The surface casing boring will be drilled by the auger or rotary method and its diameter will be of sufficient size to allow installation of the surface casing and an annular seal between the surface casing and the formation. The surface casing will be installed at or above ground surface to accommodate mud-rotary drilling equipment. The annular seal will consist of cement grout installed in the annulus between the surface casing and the borehole, using the tremie method. The surface annular seal will extend from the land surface to the total depth of the surface casing, a depth of 20 feet. The purpose of the surface casing is to provide ground support during the subsequent stages of drilling, and to prevent the migration of surface water into the boring and well annulus.

The borehole in which the well will be constructed will be drilled from the bottom of the surface casing borehole to approximately 20 feet below the bottom of the oxide zone using the direct mud rotary, reverse circulation mud rotary, or a casing advance drilling method as conditions require. The well boring's diameter will be of sufficient size to allow installation of the well casing and annular materials described above in Section C.2, Well Design.

C.3.3 Open Hole Geophysics

Open-hole geophysical logs will be run in each well boring for the purpose of formation evaluation, depth control, and detection of borehole anomalies.

Geophysical tools will include caliper, gamma-ray, temperature, directional survey, and electrical logs. In addition, compensated neutron-density logs will be run in selected borings within the ISCR well field at a rate of one per resource block. Porosity values determined from the neutron-density logs will be compared to porosities applied to the groundwater flow model in the ISCR well field area. If significant differences are found in the comparison of model porosities and log porosities, porosity values in the model will be revised accordingly.

C.3.4 Well Casing and Installation

Each well will be constructed of blank casing material in the upper part of the well from land surface to a depth of 40 feet below the top of bedrock (which corresponds to a depth of 40 feet below the top of the oxide zone). Well casing installed in the injection zone starting 40 feet below the top of bedrock will consist of one or more screened intervals separated by blank casing segments, to the bottom of the well. Casing materials for injection and recovery wells will be designed to resist corrosion, not fail in tension, and not collapse or burst. Proposed casing materials are described above in Section C.2, Well Design.

During installation of the well casing and screen, the borehole will be kept full of drilling fluid and free of any obstructions detrimental to completing casing installation. The well casing and screen will be centered in the hole so as not to interfere in any way with the complete well installation. Casing centralizers will be secured to the well casing and screened at 40-foot intervals. The casing and screen will be hung in tension and centered in the borehole until the filter pack and cement grout seal have been installed. Casing installation will continue on a 24-hour per day, 7-day per week basis until completed.

Each of the injection, recovery, observation, and perimeter wells constructed with PVC or FRP well casings will have ACD devices installed. One ACD will be attached to the exterior of the well casing at a point as close as possible to the top of the MFGU, and no more than 10 feet above the MFGU where the aquifer exemption extends to the MFGU. On the western side of the ISCR area, and at localized areas within the ISCR area, the aquifer exemption extends 200 feet above the bedrock contact; in these areas, the ACD will be installed at a point 200 feet above bedrock. The ACD will consist of a pair of metal bands spaced one meter apart and connected to electrical wires which extend to the surface. A schematic diagram of the ACD is included in Figure C-4.

During casing installation, a 2-inch diameter metal tremie pipe will be installed into the annular space between the well casing and the borehole wall. The tremie pipe will be used to place formation stabilizer materials (filter pack), such as silica sand, adjacent to screened casing intervals and to install sand and cement adjacent to blank casing intervals to form the filter pack and hydraulic seals within the annular space between the blank casing intervals and the borehole wall. The tremie pipe will be removed from the well as construction and sealing operations are completed.

C.3.5 Filter Pack and Intermediate Seal Installation

Drilling fluid will be maintained throughout the full depth of the well to land surface, and the well casing and screen will be hung in tension until the filter material placement has been completed to the specified level, while the filter pack and intermediate seal materials are installed. During placement, a swab block will be located inside the well screen below the fill depth of the annular material. The swab block will be reciprocated to remove fine-grained material, prevent bridging, and aid in settling the filter pack in the borehole after filter pack has been installed above the top of the screened interval.

Filter pack (i.e., silica sand) will be placed to continuously fill the annulus to the specified level. Filter pack will be installed by use of the tremie pipe. The tremie pipe will be located at a distance of approximately 40 feet above the interval being filled during placement. As required by formation conditions, intermediate seals may be installed at selected intervals within the injection zone as shown on Figure C-1. Seal material will be installed using the same tremie pipe used for installing the filter pack material.

The tremie pipe will be moved upward during installation of the sand and seal intervals, until the filter pack is installed above the uppermost well screen interval. The level of the filter pack will be measured periodically during placement with a wireline sounder. Placement of the materials will be continuous, except when additional precautions are necessary to prevent bridging or when measurements of the level are being conducted. The quantity of materials placed in the annulus will not be less than that of the computed volume.

The same tremie pipe will then be utilized for cementing the upper portion of the well casing as described below.

C.3.6 Cementing Characteristics for All Class III Wells

Injection, recovery, observation, and perimeter wells will be of a single design and will each use the same cementing procedure. The well borings will be of a constant diameter, drilled in a single stage. Once the well casing, screen, and filter pack have been installed in the boring, cementing of the upper portion of the well casing, from the bottom of the bedrock exclusion zone to ground surface, will be accomplished by pumping a cement slurry down a tremie pipe positioned with the lower end near the bottom of the exclusion zone, forcing the cement to fill the annular space between the borehole and casing from the bottom up to the surface. Cement grout will be placed to completely fill the well annulus within the specified interval. Prior to pumping, the cement grout will be passed through a ½-inch slotted bar strainer in order to remove any unmixed lumps.

Florence Copper does not plan to use a grouting shoe at the bottom of the casing to circulate cement in the annulus behind the casing because the planned ISCR well will be drilled and constructed in a single pass and will use a conventional well screen to achieve maximum open area to optimize flow into the well.

Use of a grouting shoe is not conducive to the use of conventional well screen and single pass well construction. Use of a grouting shoe requires that a solid well casing be emplaced to the full depth of the borehole if the well is to be constructed in a single pass. The grouting shoe would then be used to circulate cement in the annulus behind the well casing. After the cement has cured, the casing is then perforated using a perforating tool. Use of the grouting shoe and perforating method in a single-pass construction well results in the following adverse conditions in the perforated area:

1. The perforations constitute less open area than the conventional well screen and filter pack system, limiting exposure to the targeted injection zone.
2. Cement is circulated through the target injection zone, sealing fractures that are necessary to allow solution access to the copper-bearing mineralization. The minerals targeted for ISCR production are fracture lining copper-oxide minerals. If the fractures receive circulated cement, they will not receive ISCR solution, and no well stimulation is permitted to reopen sealed fractures.
3. The cement circulated through the injection zone is an acid consuming material. Cement in the injection zone will adversely impact the planned ISCR operations by consuming the acid intended to dissolve the targeted copper mineralization.

Use of a grouting shoe at the Florence Copper site would require wells to be drilled and constructed using a two-pass drilling system. The two-pass system would require that a large 20-inch diameter borehole be drilled from ground surface to a point 50 feet below the top of bedrock. The grouting shoe would then be used to circulate cement in the annulus behind the well casing. After the cement has cured, a smaller 12-inch borehole would be drilled through the cement plug at the bottom of the casing to the full depth of the well. Conventional well casing, well screen, and filter pack would then be emplaced. Use of the grouting shoe and perforating method in a two-pass construction well results in the following adverse impacts:

1. This construction method prevents the use of ACDs to detect migration of injected fluid at the well casing/cement interface.
2. The cost, complexity, and time required to complete each well is nearly doubled compared to the single-pass well construction.
3. Borehole diameter is increased to the point that the utility of certain conventional logging tools such as neutron, neutron-density, nuclear magnetic resonance, and cement bond are diminished.

At the PTF, Florence Copper constructed wells that met UIC Class III requirements using three different well construction methods and materials combinations. The injection and recovery wells were constructed using a two-pass construction method, with a large diameter steel outer casing with welded joints and fiberglass inner casing with threaded joints. The PTF observation wells were constructed using a single-pass drilling and construction method with threaded fiberglass well casing. The supplemental monitoring wells constructed within the AOR were drilled and constructed using the single-pass method with threaded steel well casing. Both the injection/recovery wells and the observation wells passed mechanical integrity testing using the standard annular pressure test (SAPT), demonstrating that both the two-pass and single-pass drilling construction methods can be used to meet UIC Class III well performance criteria. Each of the single-pass PTF observation wells was grouted using the tremie pipe method.

By contrast, the threaded steel well casing used at the supplemental monitoring wells relied on O-rings at the joints to maintain pressure during the SAPT. Consequently, additional measures were required to demonstrate mechanical integrity at several of the supplemental monitoring wells. Florence Copper does not plan to use threaded steel casing for any of the Class III wells proposed for the commercial ISCR facility.

The discharge end of the tremie pipe will be continuously submerged in the cement until the zone to be filled is completely filled. An acid-resistant, sulfate-resistant, Portland Type V cement or USEPA-approved substitute will be placed in the well annuli of all wells from the bottom of the casing to land surface. The well casing will be hung in tension until the cement has cured. The well casing will be filled with a fluid of sufficient density to maintain pressure equalization with the cement slurry in the annulus to prevent collapse of the well casing during the cementing operation.

Water and/or appropriate mud-breaker chemicals will be circulated through the casing or tremie pipe prior to cement placement to reduce mud viscosity and assist in removal of mud from the borehole/casing annulus. An excess quantity of cement will be pumped into the annular space in order to verify “clean” slurry returns from the well prior to terminating the cementing operation. Following placement of the cement slurry, the cement will be allowed to cure for a minimum of 24 hours before performing additional operations on the well.

The cement will be Type V unless the Permittee submits the following information to the Director regarding a Type V substitute:

i. The results of an immersion test for resistance to pregnant leach solution of equivalent mass samples of Type V cement and any proposed substitute cement;

ii. A comparison of the percentage weight change between samples; and

iii. A demonstration that the substitute experiences little visual change, a weight increase or decrease within 5 to 8 percent, and no significant change in compressive strength.

Upon completion of this demonstration, and subject to USEPA approval, a substitute cement that meets these criteria may be substituted for Type V cement for well construction.

C.3.7 Cased Hole Geophysics

Cased-hole geophysical logs will be run in all injection, recovery, observation, and perimeter wells after casing has been installed and cemented to the surface. Cased hole logs will include:

- Sonic (for cement bond with fiberglass reinforced pipe [FRP]);
- 4 pi density (for cement bond with FRP);
- Dual density (for cement bond with FRP);
- Natural gamma;

- Fluid conductivity;
- Temperature;
- Nuclear magnetic resonance;
- Dual induction; and
- Gyroscopic deviation.

The pre-injection temperature logs will serve as a baseline for later casing integrity analyses. Temperature logs will be run on newly constructed injection wells at 30 days and 60 days after injection has begun. Additional geophysical surveys will be conducted as required by USEPA.

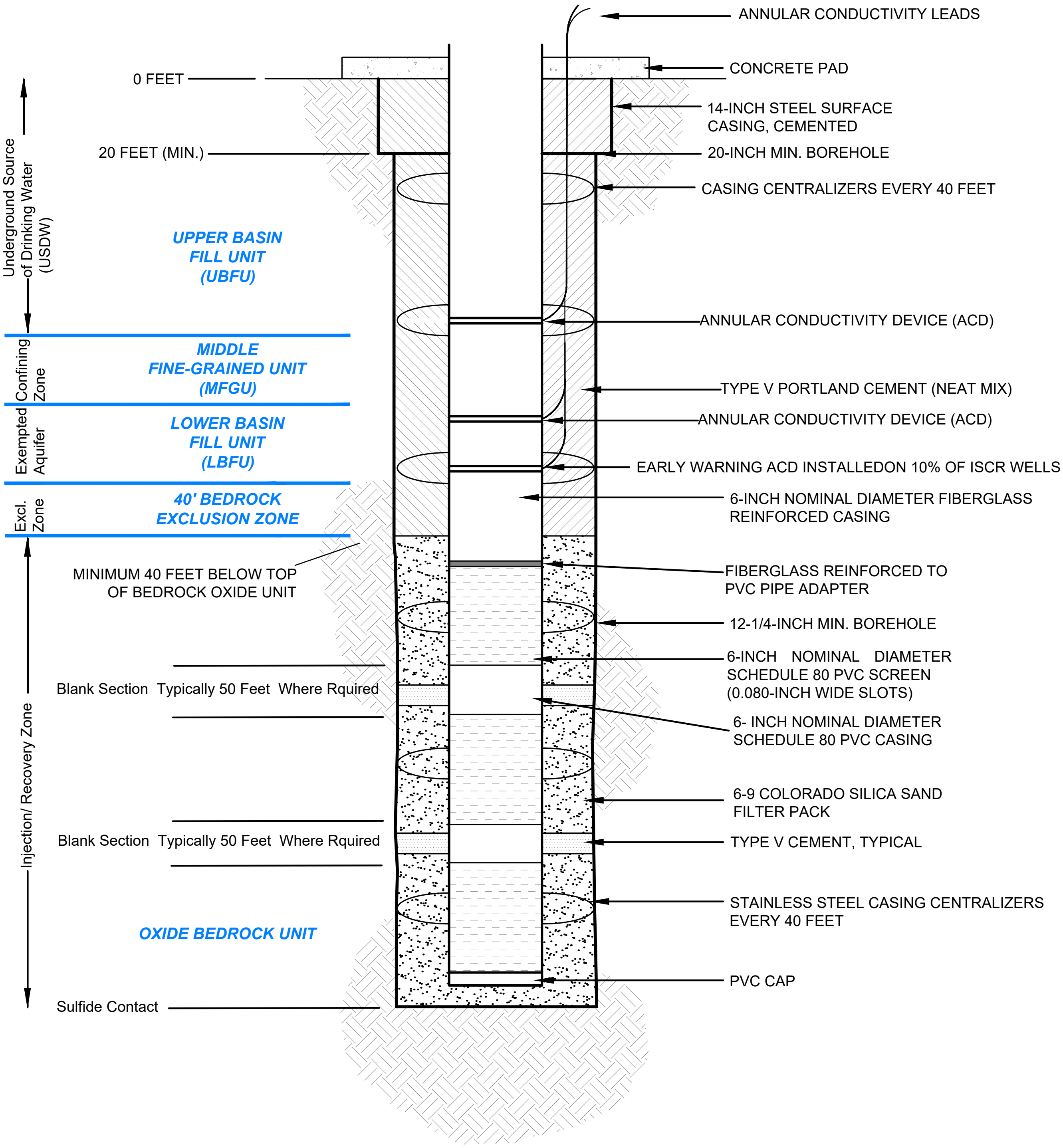
C.3.8 Formation Stimulation Plan

Florence Copper does not propose to use any formation stimulation during the development of the FCP ISCR well field.

C.3.9 Alarms and Shutdown Systems

The planned alarm and shutdown systems that will be implemented at the ISCR well field are described in the Operations Plan included in Attachment D of this Application.

FIGURES



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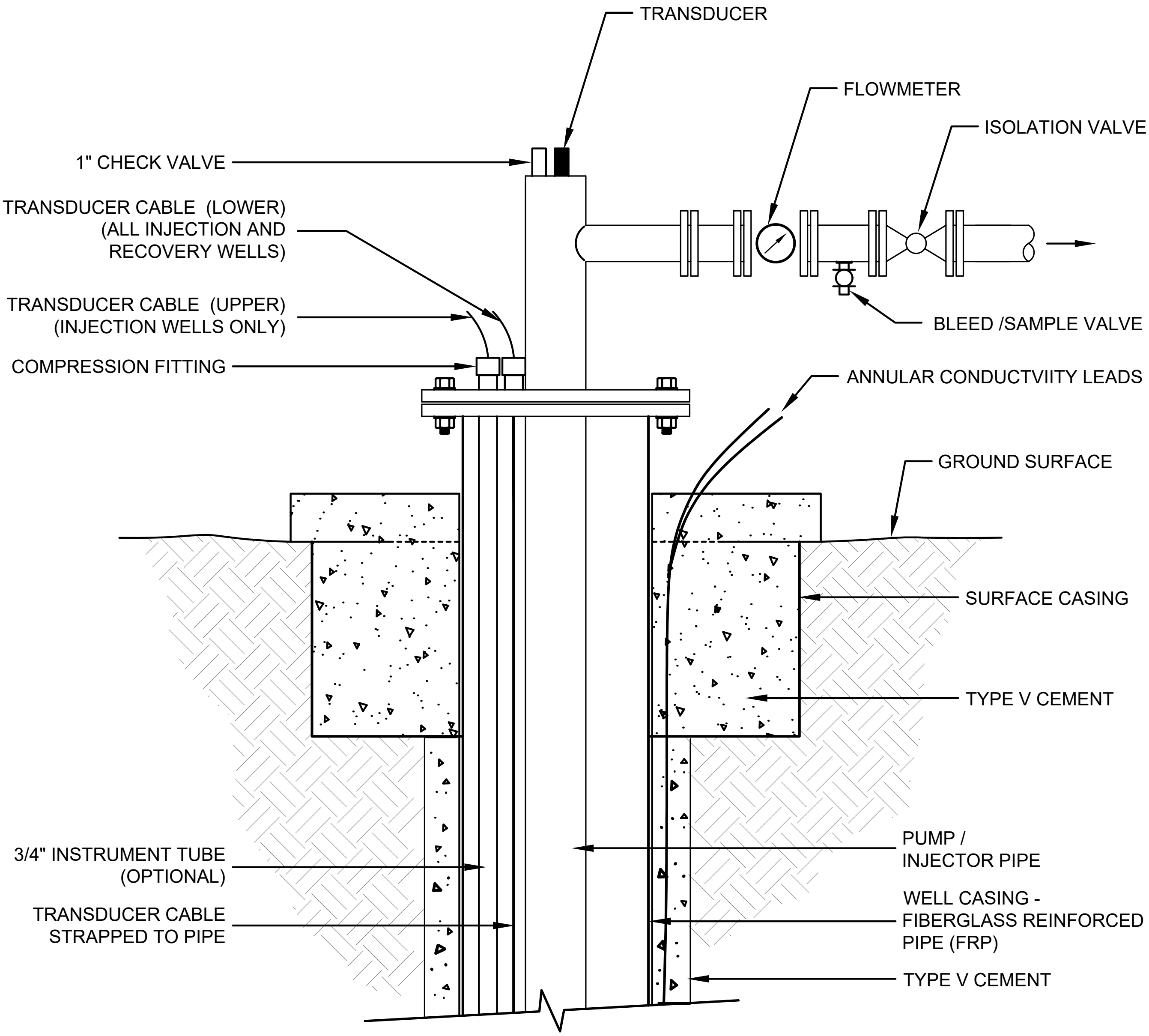
FLORENCE, ARIZONA

INJECTION / RECOVERY WELL CONSTRUCTION DIAGRAM

SCALE: AS SHOWN
JULY 2020

FIGURE C-1

Saved by: LUCIDO, SAM Printed: 6/6/2019 12:47 PM Sheet: INJECTION-RECOVERY WELL
\\HALEYALDRICH.COM\SHARE\PHX_COMMON\PROJECTS\FLORENCE COPPER\132473 FLORENCE GROUNDWATER PERMITTING\WORKING\101704 SIGNIFICANT AMENDMENT\CAD\WELL DIAGRAMS\132473-002_0001-9-1.DWG



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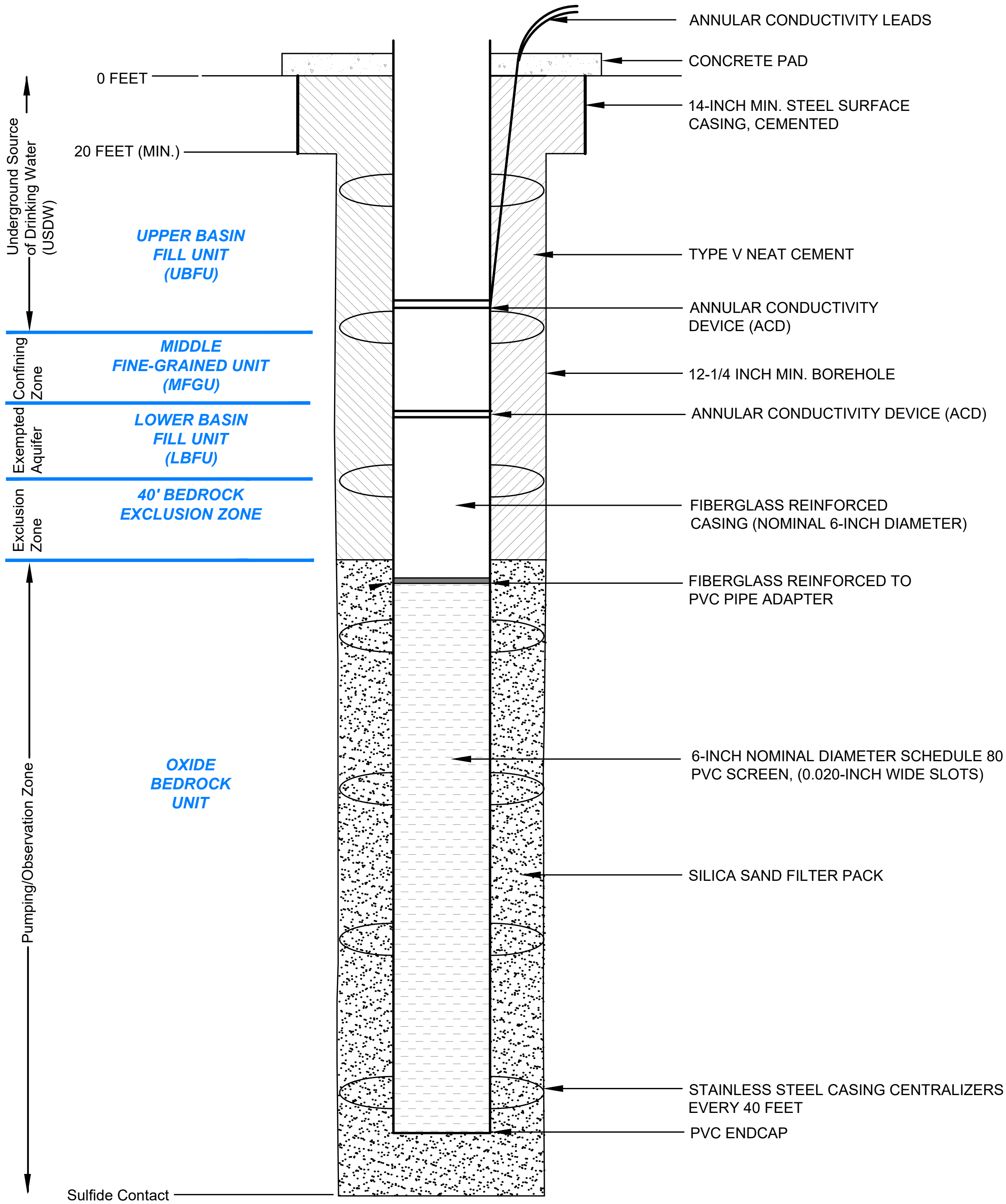
FLORENCE, ARIZONA

INJECTION / RECOVERY WELL HEAD DETAIL

SCALE: AS SHOWN
JUNE 2019

FIGURE C-2



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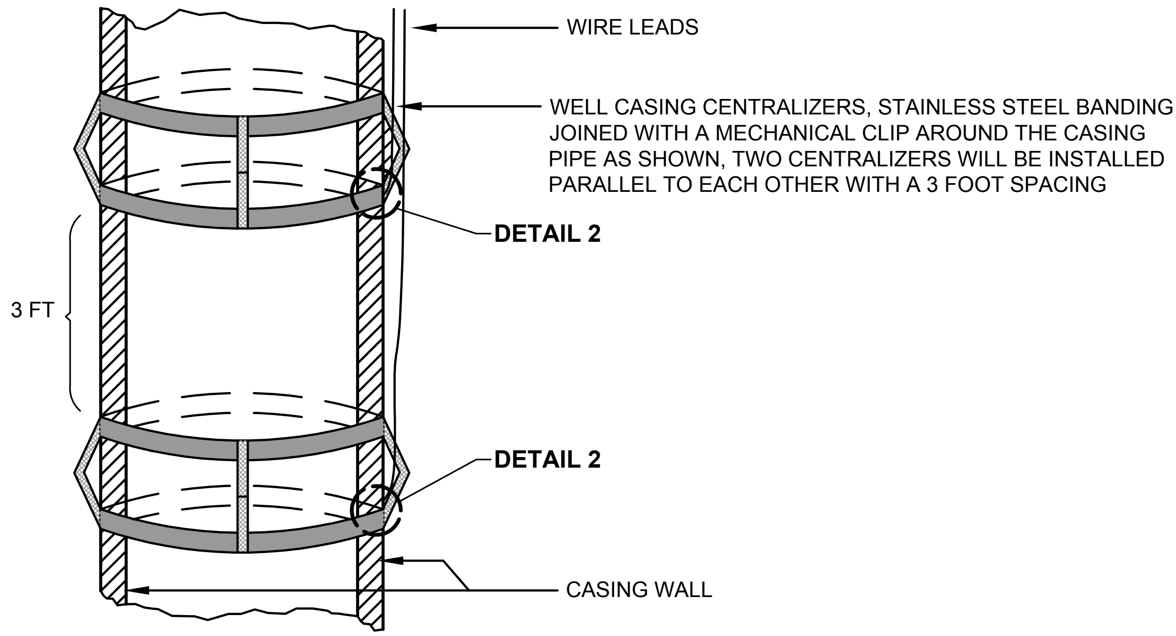
PERIMETER / OBSERVATION WELL
CONSTRUCTION DIAGRAM

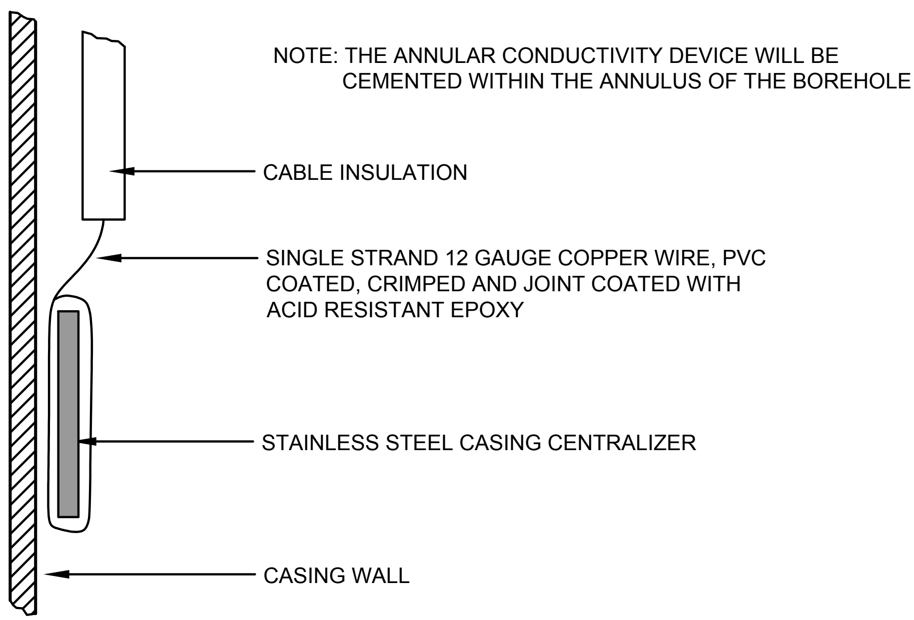
SCALE: AS SHOWN
JULY 2020

FIGURE C-3



ANNULAR CONDUCTIVITY DEVICE DETAIL 1

NOT TO SCALE



ANNULAR CONDUCTIVITY DEVICE DETAIL 2

NOT TO SCALE

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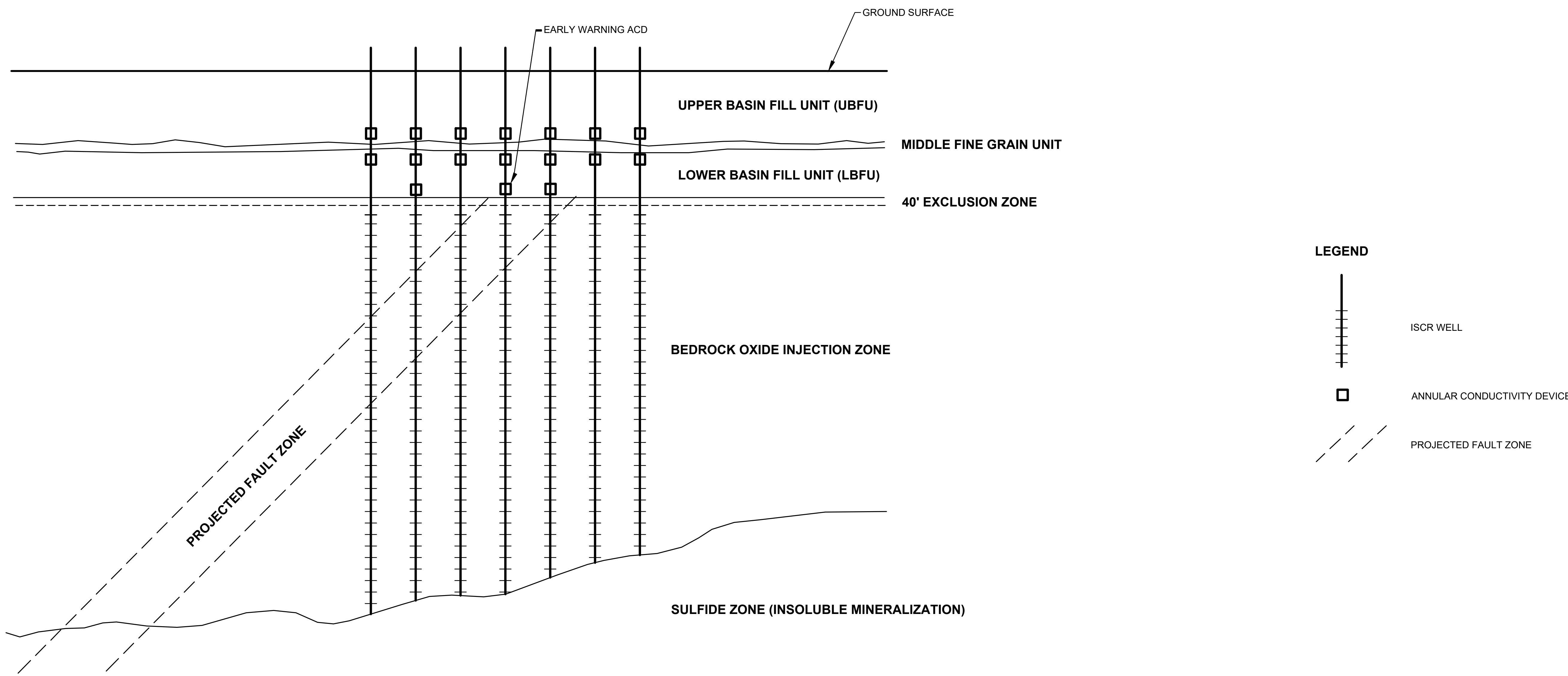
ANNULAR CONDUCTIVITY
DEVICE DETAILS

SCALE: AS SHOWN
JUNE 2019

FIGURE C-4



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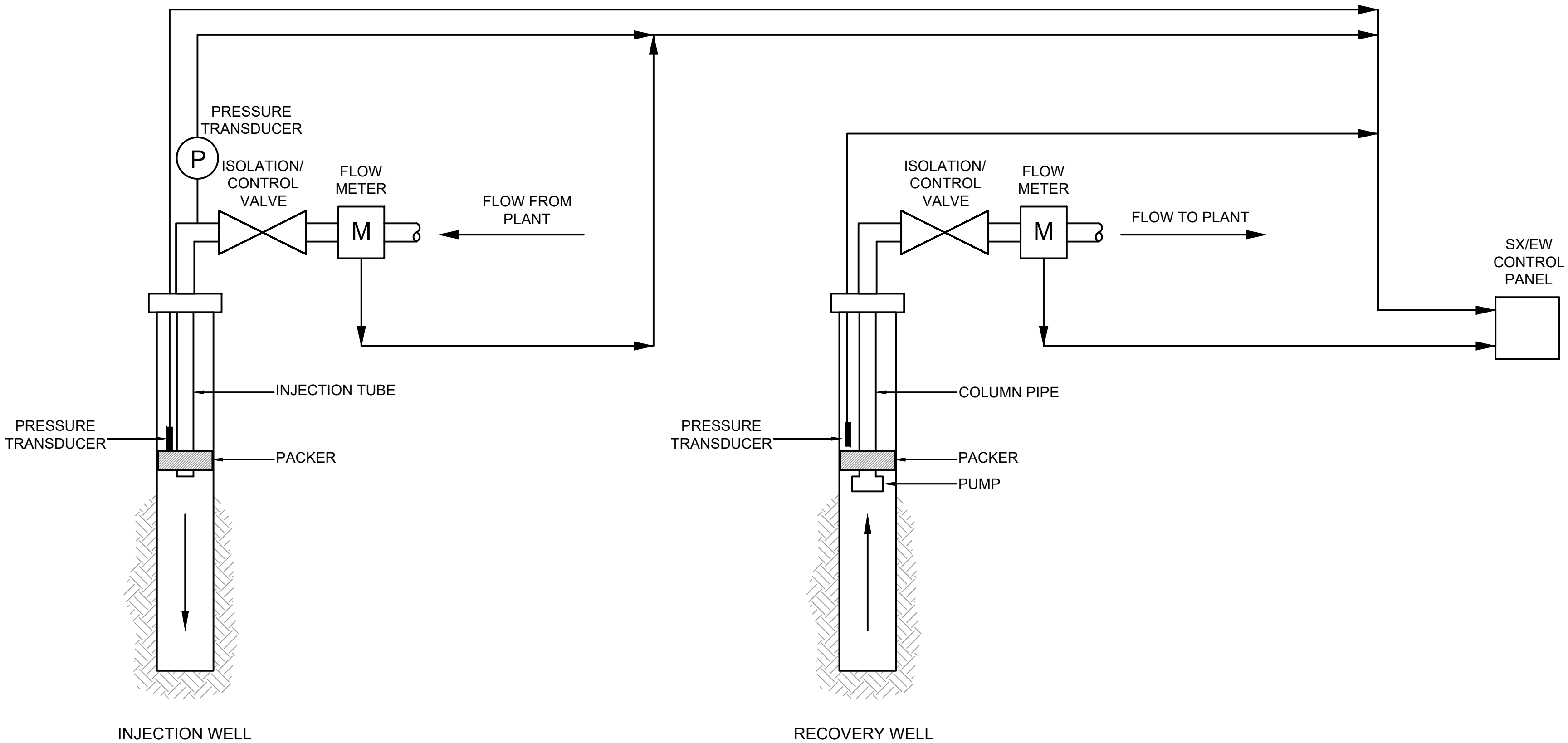
UIC PERMIT APPLICATION

TYPICAL PLACEMENT OF ANNULAR CONDUCTIVITY DEVICES (ACDs) AT ISCR WELLS INTERSECTING FAULTS

SCALE: AS SHOWN
December 2020

FIGURE C-4a



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INJECTION / RECOVERY WELL SYSTEMS CONTROLS

SCALE: AS SHOWN
JULY 2019

FIGURE C-5

EXHIBIT C-1

PTF Annular Conductivity Data

EXHIBIT C-1

PTF ANNULAR CONDUCTIVITY DATA

Date	Well ID (HGI)	Well ID (Florence Copper)	Time	1 Resistance (Ω)	2 Resistance (Ω)	3 Resistance (Ω)	Data Acceptance	Resistance Stats Field Average
9/21/2018	JB-WB-04	WB-04	1725	61.57	61.61	61.35	PASS	61.50
12/20/2018	JB-WB-04	WB-04	1355	61.8	61.8	61.54	PASS	61.70
4/4/2019	JB-WB-04	WB-04	1238	61.71	61.74	61.57	PASS	61.7
5/2/2019	JB-WB-04	WB-04	1456	62.25	62.3	62.15	PASS	62.2
7/10/2019	JB-WB-04	WB-04	1237	62.12	62.21	62.13	PASS	62.2
10/3/2019	JB-WB-04	WB-04	1221	62.17	62.342	62.314	PASS	62.3

Date	Well ID (HGI)	Well ID (Florence Copper)	Time	1 Resistance (Ω)	2 Resistance (Ω)	3 Resistance (Ω)	Data Acceptance	Resistance Stats Field Average
9/21/2018	JB-WB-03	WB-03	1731	76.04	76.57	76.54	PASS	76.40
12/20/2018	JB-WB-03	WB-03	1353	76.13	76.51	76.41	PASS	76.40
4/4/2019	JB-WB-03	WB-03	1248	76.2	76.61	76.59	PASS	76.5
5/2/2019	JB-WB-03	WB-03	1450	76.58	76.85	76.82	PASS	76.8
7/10/2019	JB-WB-03	WB-03	1241	76.45	76.61	76.6	PASS	76.6
10/3/2019	JB-WB-03	WB-03	1226	76.168	76.333	76.403	PASS	76.3

Date	Well ID (HGI)	Well ID (Florence Copper)	1 Resistance (Ω)	2 Resistance (Ω)	3 Resistance (Ω)	Data Acceptance	Resistance Stats Field Average
9/21/2018	JB-WB-02	WB-02	65.54	66.61	66.99	PASS	66.40
12/20/2018	JB-WB-02	WB-02	70.25	71.34	71.57	PASS	71.10
4/4/2019	JB-WB-02	WB-02	73.71	74.93	74.92	PASS	74.5
5/2/2019	JB-WB-02	WB-02	75.31	76.14	75.97	PASS	75.8
7/10/2019	JB-WB-02	WB-02	76.77	77.66	77.3	PASS	77.2
10/3/2019	JB-WB-02	WB-02	77.909	78.754	78.404	PASS	78.4

Date	Well ID (HGI)	Well ID (Florence Copper)	1 Resistance (Ω)	2 Resistance (Ω)	3 Resistance (Ω)	Data Acceptance	Resistance Stats Field Average
9/21/2018	JB-WB-01	WB-01	51.94	51.07	50.88	PASS	51.30
12/20/2018	JB-WB-01	WB-01	52.22	51.61	51.25	PASS	51.70
4/4/2019	JB-WB-01	WB-01	52.42	51.76	51.44	PASS	51.9
5/2/2019	JB-WB-01	WB-01	51.92	51.26	50.95	PASS	51.4
7/10/2019	JB-WB-01	WB-01	52.21	51.37	51.04	PASS	51.5
10/3/2019	JB-WB-01	WB-01	47.764	47.531	47.432	PASS	47.6

Date	Well ID (HGI)	Well ID (Florence Copper)	1 Resistance (Ω)	2 Resistance (Ω)	3 Resistance (Ω)	Data Acceptance	Resistance Stats Field Average
9/21/2018	JB-B-01	O-01	56.25	55.14	54.78	PASS	55.40
12/20/2018	JB-B-01	O-01	57.7	57.11	56.7	PASS	57.20
4/4/2019	JB-B-01	O-01	57.33	57.59	57.59	PASS	57.5
5/2/2019	JB-B-01	O-01	60.3	59.69	59.46	PASS	59.8
7/10/2019	JB-B-01	O-01	61.63	61.05	60.87	PASS	61.2
10/3/2019	JB-B-01	O-01	63.112	62.552	62.389	PASS	62.7

Date	Well ID (HGI)	Well ID (Florence Copper)	1 Resistance (Ω)	2 Resistance (Ω)	3 Resistance (Ω)	Data Acceptance	Resistance Stats Field Average
9/21/2018	JB-B-07	O-07	52.49	51.65	51.29	PASS	51.80
12/20/2018	JB-B-07	O-07	53.23	52.49	52.2	PASS	52.60
4/4/2019	JB-B-07	O-07	53.9	53.09	52.83	PASS	53.3
5/2/2019	JB-B-07	O-07	54.12	53.42	53.11	PASS	53.6
7/10/2019	JB-B-07	O-07	55.29	54.44	54.15	PASS	54.6
10/3/2019	JB-B-07	O-07	54.682	53.933	53.661	PASS	54.1

Date	Well ID (HGI)	Well ID (Florence Copper)	1 Resistance (Ω)	2 Resistance (Ω)	3 Resistance (Ω)	Data Acceptance	Resistance Stats Field Average
9/21/2018	JB-B-06	O-06	59.94	59.36	59.16	PASS	59.50
12/20/2018	JB-B-06	O-06	59.97	59.21	58.91	PASS	59.40
4/4/2019	JB-B-06	O-06	59.52	58.52	58.15	PASS	58.7
5/2/2019	JB-B-06	O-06	59.52	58.46	57.92	PASS	58.6
7/10/2019	JB-B-06	O-06	59.48	58.16	57.58	PASS	58.4
10/3/2019	JB-B-06	O-06	58.679	57.166	56.644	PASS	57.5

Date	Well ID (HGI)	Well ID (Florence Copper)	1 Resistance (Ω)	2 Resistance (Ω)	3 Resistance (Ω)	Data Acceptance	Resistance Stats Field Average
9/21/2018	JB-B-05	O-05B	77.95	77.65	77.57	PASS	77.70
12/20/2018	JB-B-05	O-05B	79.13	78.74	78.66	PASS	78.80
4/4/2019	JB-B-05	O-05B	81.43	80.96	80.78	PASS	81.1
5/2/2019	JB-B-05	O-05B	82.02	81.49	81.25	PASS	81.6
7/10/2019	JB-B-05	O-05B	83.37	82.74	82.47	PASS	82.9
10/3/2019	JB-B-05	O-05B	84.221	83.605	83.311	PASS	83.7

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PTF ANNULAR CONDUCTIVITY DATA

Date	Well ID (HGI)	Well ID (Florence Copper)	1 Resistance (Ω)	2 Resistance (Ω)	3 Resistance (Ω)	Data Acceptance	Resistance Stats Field Average
9/21/2018	JB-B-04	O-04	59.92	59.84	59.85	PASS	59.90
12/20/2018	JB-B-04	O-04	59.69	59.36	59.28	PASS	59.40
4/4/2019	JB-B-04	O-04	59.46	58.92	58.78	PASS	59.1
5/2/2019	JB-B-04	O-04	59.46	58.75	58.6	PASS	58.9
7/10/2019	JB-B-04	O-04	58.66	57.65	57.37	PASS	57.9
10/3/2019	JB-B-04	O-04	57.721	56.476	56.071	PASS	56.8

Date	Well ID (HGI)	Well ID (Florence Copper)	1 Resistance (Ω)	2 Resistance (Ω)	3 Resistance (Ω)	Data Acceptance	Resistance Stats Field Average
9/21/2018	JB-B-03	O-03	46.88	46.22	45.97	PASS	46.40
12/20/2018	JB-B-03	O-03	48.05	47.37	47.03	PASS	47.50
4/4/2019	JB-B-03	O-03	48.81	47.98	47.55	PASS	48.1
5/2/2019	JB-B-03	O-03	49.15	48.28	47.78	PASS	48.4
7/10/2019	JB-B-03	O-03	49.66	48.65	48.11	PASS	48.8
10/3/2019	JB-B-03	O-03	50.043	49.127	48.624	PASS	49.3

Date	Well ID (HGI)	Well ID (Florence Copper)	1 Resistance (Ω)	2 Resistance (Ω)	3 Resistance (Ω)	Data Acceptance	Resistance Stats Field Average
9/21/2018	JB-B-02	O-02	57.37	57.26	57.1	PASS	57.20
12/20/2018	JB-B-02	O-02	58.92	58.72	58.51	PASS	58.70
4/4/2019	JB-B-02	O-02	60.7	60.6	60.34	PASS	60.5
5/2/2019	JB-B-02	O-02	61.5	61.37	61.09	PASS	61.3
7/10/2019	JB-B-02	O-02	62.15	62.14	61.86	PASS	62.1
10/3/2019	JB-B-02	O-02	62.582	62.633	62.408	PASS	62.5